UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/782,106	02/12/2001	Karl J. Bois	10006879-1	9718

			EXAMINER
22879 7590 09/13/2004			ROSALES HANNER, MORELLA I

HEWLETT PACKARD COMPANY
P O BOX 272400, 3404 E. HARMONY ROAD
INTELLECTUAL PROPERTY ADMINISTRATION
FORT COLLINS, CO 80527-2400

ART UNIT	PAPER NUMBER
2128	

DATE MAILED: 09/13/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 February 2001*.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 - 20* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 - 20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 February 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
    Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Detailed Action

1.   **Claims 1 – 20** have been examined and are pending.

Drawings

2.   Figures 1 - 4 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

3.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000.

Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

3.1 Claims 1 – 12, and 14 - 19 are rejected under 35 U.S.C. 102(e) as being clearly anticipated by **a printed publication by Qingjian Yu**, entitled, **"Computational Models of Transmission Line with Skin Effects and Dielectric Loss"**, hereafter referred to as *Yu*.

3.1.1 As regard to **claims 1 and 14**, *Yu* teaches [**Pg 107, Abstract**] a method of modeling dielectric losses in a transmission line, the method comprising:

- modeling a resistance, a self-inductance, and a self-capacitance for a line as a lumped element circuit having a first port and a second port, where a signal is received on the first port [**Pg 107, Section II Lumped Models of Frequency-Dependent Factors**]; and

- modeling a dielectric loss as a scattering matrix, connected to the second port [**Pg 778, left Col**] .

3.1.2 As regard to **claims 2 and 15**, *Yu* teaches [**Pg 108, Section 2.1 Model of Dielectric Loss**] S parameters (scattering matrix) using values based upon a low-loss condition wherein the intrinsic impedance of the line is unaffected by losses, whereby reflection coefficients for the first and second ports are defined to be zero if the scattering matrix is normalized to the intrinsic impedance.

3.1.3 As regard to **claims 3 and 16,** *Yu* teaches [**Pg 108, Section 2.1 Model of Dielectric Loss**] S parameters (scattering matrix) that uses frequency dependent values.

3.1.4 As regard to **claims 4, 10 and 17,** *Yu* teaches [**Pg 108, Section 2.1 Model of Dielectric Loss, 6th paragraph**] a scattering matrix that uses values that are related to the dielectric constant of a material in which the line is embedded.

3.1.5 As regard to **claims 5 and 18,** *Yu* teaches [**Pg 107, right Col, 2nd paragraph**] the method of claim 1, further comprising calculating the resistance, inductance, and capacitance using a general circuit simulator (circuit simulation software).

3.1.6 As regard to **claims 6 and 19,** *Yu* teaches [**Pg 108, Section 2.2 Model of Skin Effect**] modeling a skin effect resistance and a skin effect inductance using an RL port (R-L tank) circuit connected to the second port.

3.1.7 As regard to **claim 7,** *Yu* teaches [**Pg 108, Section 2.2 Model of Skin Effect**] the method of claim 1, further comprising modeling the losses using circuit simulation software.

3.1.8 As regard to **claim 8,** *Yu* teaches [**Pg 107, Abstract**] a method for simulating a transmission line comprising:

- determining a resistance of a transmission line [**Pg 107, Section II Lumped Models of Frequency-Dependent Factors**];

- determining a self-inductance of the line **Pg 107, Section II Lumped Models of Frequency-Dependent Factors]**;

- determining a self-capacitance of the line **[Pg 107, Section II Lumped Models of Frequency-Dependent Factors]**;

- creating a computer model of the line as a schematic having first and second ports **[Pg 107, Section II Lumped Models of Frequency-Dependent Factors]**;

- modeling the resistance as a resistor in series with an inductor that represents the self-inductance **[Pg 107, Section II Lumped Models of Frequency-Dependent Factors]**;

- modeling the self-capacitance as a capacitor connected to the line **[Pg 107, Section II Lumped Models of Frequency-Dependent Factors]**; and

- modeling a dielectric loss as s parameters (scattering matrix) connected to the second port, wherein the s parameters represent conductance of the transmission lines across a broad band of frequencies **[Pg 108, Section 2.1 Model of Dielectric Loss]**.

3.1.9 As regard to **claim 9**, Yu teaches **[Pg 108, Section 2.1 Model of Dielectric Loss]** modeling a signal received on the first port.

3.1.10 As regard to **claim 11**, Yu teaches **[Pg 107, Section I Introduction]** a method for simulating a transmission line, wherein the transmission line is a line on an electronic circuit board or an integrated circuit chip.

3.1.11   As regard to **claim 12**, *Yu* teaches [**Pg 107, Section I Introduction**] a method

for simulating a transmission line, wherein the line is simulated using circuit simulation

software.

Claim Rejections - 35 USC § 103

4.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for

all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1,

148 USPQ 459 (1966), that are applied for establishing a background for

determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1.   Determining the scope and contents of the prior art.
2.   Ascertaining the differences between the prior art and the claims at issue.
3.   Resolving the level of ordinary skill in the pertinent art.
4.   Considering objective evidence present in the application indicating
          obviousness or nonobviousness.

4.1.   **Claims 13 and 20** are rejected under 35 U.S.C. 103(a) as being

unpatentable over *Yu* as applied to claims 8 and 14 above, and further in view of a

printed publication by **Yungseon Eo** entitled **"S-Parameter-Measurement-Based**

High-Speed Signal Transient Charactererization of VLSI Interconnects on SiO2-Si

Substrate" As regard to **claims 13 and 20**, *Yu* teaches [**Pg 108 Section 2.1 Model of**

Dielectric Loss] modeling the dielectric loss using the complex permittivity (specifically the imaginary part) and conductance per unit length and material of the dielectric as well as using a two -port transmission line. *Yu* also teaches [**Pg 107, Section I introduction**] that there is a need in the art for a general circuit simulator that simplifies the modeling of dielectric losses of frequency dependent transmission lines.

Yu does not expressly teach modeling the dielectric loss comprises using a two-by-two matrix described as:

$$[S] = \begin{bmatrix} 0 & \exp\left(-\dfrac{\pi f \sqrt{\varepsilon_r}\tan\delta}{c}\cdot l\right) \\ \exp\left(-\dfrac{\pi f \sqrt{\varepsilon_r}\tan\delta}{c}\cdot l\right) & 0 \end{bmatrix}$$

Eo teaches [**Pg 470, right col**] that it is inherently difficult to simultaneously investigate both the material effect and frequency-variant transmission line parameters with a circuit model and that due to such difficulties, s-parameters-based techniques have been developed which can implicitly include all these complicated parametric variations of such lines up to a broad frequency band.

It would have been obvious to one of ordinary skills in the art, at the time of the invention to implement the general circuit simulator that simplifies the modeling of dielectric losses of frequency dependent transmission lines, as taught by *Yu* using s-parameter-based techniques that implicitly include all the complicated parametric variations of transmission lines as taught by *Eo*.

Additional references

5.   The following is a list of references that are relevant to the claimed
invention but were not cited by the examiner:

- U.S. Patent No. 4,973,174 issued to Losic et al.

- U.S. Patent No. 6,137,293 issued to Wu et al.

- U.S. Patent No. 5,365,179 issued to Rogers, Wesley A.

- Rubin, L.M.; "Application of path integrals in modeling transmission line loss"; Components, Packaging, and Manufacturing Technology, Part B: Advanced Packaging, IEEE Transactions on [see also Components, Hybrids, and Manufacturing Technology, IEEE Transactions on] , Volume: 19 , Issue: 4 , Nov. 1996 Pages:775 - 788

- Gordon, C.; Blazeck, T.; Mittra, R.;"Time-domain simulation of multiconductor transmission lines with frequency-dependent losses"; Computer-Aided Design of Integrated Circuits and Systems, IEEE Transactions on , Volume: 11 , Issue: 11 , Nov. 1992; Pgs:1372 - 1387

- Bois, K.J.; Handjojo, L.F.; Benally, A.D.; Mubarak, K.; Zoughi, R.; "Dielectric plug-loaded two-port transmission line measurement technique for dielectric property characterization of granular and liquid materials"; Instrumentation and Measurement, IEEE Transactions on , Volume: 48 , Issue: 6 , Dec. 1999 Pgs:1141 - 1148

- Veijola, T.; Valtonen, M.; "Dispersive transmission line model for nonlinear time domain circuit analysis"; Circuits and Systems, 1988, IEEE International Symposium on , 7-9 Jun 1988 Pgs:2839 - 2842 vol.3
- Janezic, M.D.; Jargon, J.A.;"Complex permittivity determination from propagation constant measurements" Microwave and Guided Wave Letters, IEEE [see also IEEE Microwave and Wireless Components Letters] , Volume: 9 , Issue: 2 , Feb. 1999 ;Pages:76 - 78

6.   Any inquiry concerning this communication or earlier communication from the examiner should be directed to Morella Rosales-Hanner whose telephone number is (703) 305-8883. The examiner can normally be reached Monday-Friday from 7:00 a.m. to 3:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jean Homere can be reached on 703 308-6647. The fax number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

MRH

Aug. 24th, 2004